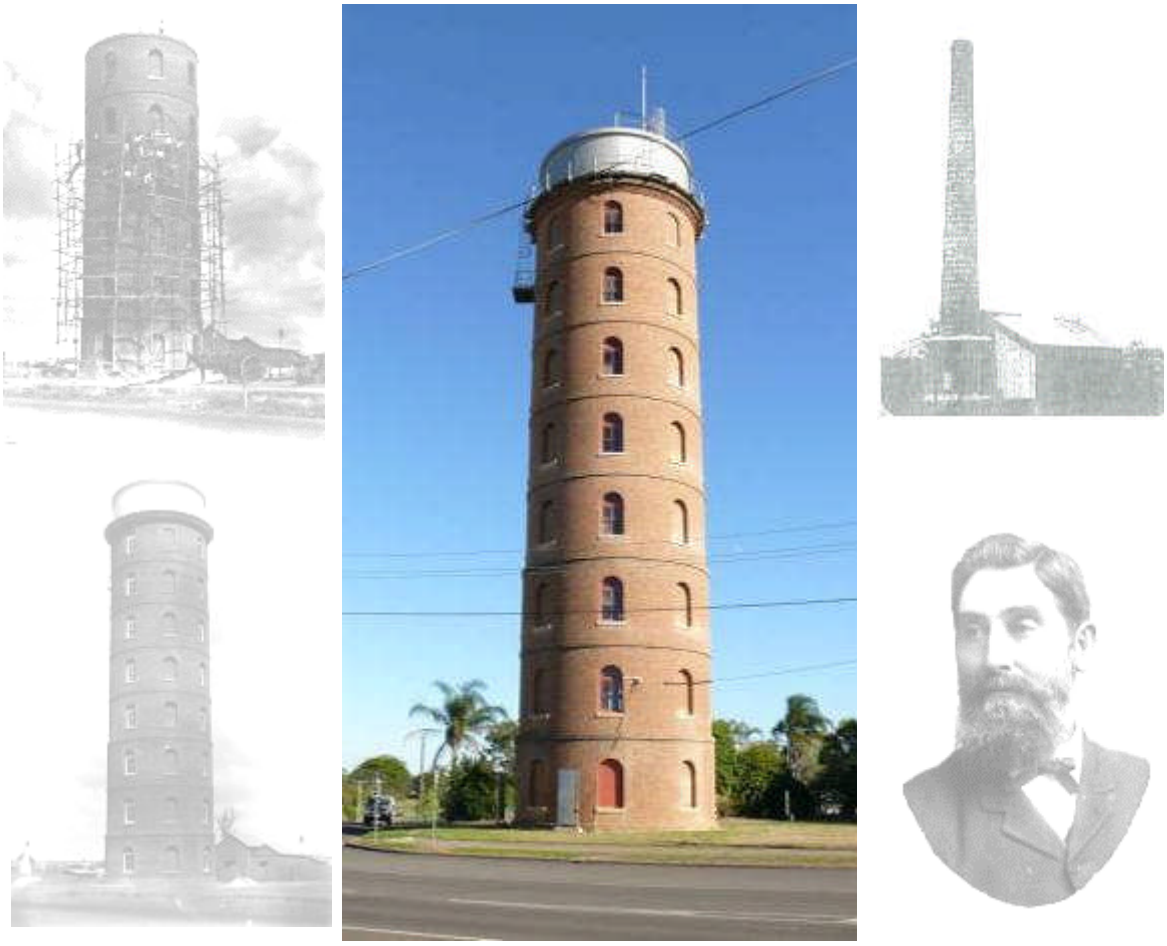
Nomination of

BUNDABERG WATERWORKS 1902

for recognition as an

ENGINEERING HERITAGE MARKER

under the Heritage Recognition Program



By

Engineers Australia, Burnett Local Group

December 2010

Nomination prepared by:
Geoff Bullpitt, Engineers Australia - Burnett Local Group

1. INTRODUCTION

Bundaberg's first reticulated water supply, known officially at the time as the Bundaberg Waterworks, was commissioned on Friday 19 September 1902 by J.B. Henderson the Queensland Government Hydraulic Engineer and handed over to the Municipal Council the following day. Completion of the scheme marked a significant stage in the development of the town's infrastructure during an important era in the growth of Bundaberg as a major regional city. It provided a good solution to a growing community need.

The scheme was a long time in coming. The Municipal Council first secured Henderson's services in 1884 to report on the source, means and cost of providing a water supply for the town but the initial schemes investigated proved too expensive for the council's available revenue. This was followed by a period when the council investigated and developed its own design for a water supply scheme with the assistance of Rockhampton hydraulic engineer, N.C. Clements. Council sought the necessary Queensland Treasury approvals but the grant of a loan was declined.

The economic depression of the early 1890s further delayed a water supply for the town and it was 1896 before the Municipal Council again considered the matter and invited Henderson to visit Bundaberg to discuss it. Design criteria were agreed on. Council adopted the scheme design submitted by the Water Supply Department, estimated to cost £20,000, in November 1898. A loan was secured in the Parliamentary Estimates of 1899-1900.

Following the necessary tender processes, construction commenced in April 1901 and was completed in September 1902. Day to day supervision of the scheme was undertaken by Assistant Engineer Williams of the Water Supply Department under Henderson's direction. Henderson visited the site on a number of occasions including for the final inspection.

The Bundaberg Waterworks provided an adequate, reliable and safe water supply for many years to come at a cost the community could afford.

Bundaberg Waterworks 1902

The Bundaberg Waterworks, completed in 1902, sourced it supply from Baldwin Swamp in East Bundaberg via a deep waterhole on the upper reaches of Bundaberg Creek and comprised three (3) major elements:

- Pumping station and intake;
- Water Tower; and
- Trunk delivery main and reticulation network.

The pumping station was located at the end of Victoria Street, East Bundaberg and comprised a boiler and pump house constructed by David R. Jones between December 1901 and June 1902. The station contained two (2) 25 horsepower Cornish type boilers, each 20 feet long by 5 feet 6 inches in diameter manufactured by the Bundaberg Foundry Company and two (2) horizontal direct-acting duplex type pumps each with a maximum capacity of 10,000 gallons per hour manufactured by the Snow Manufacturing Company and supplied by Smellie and Company. Installation of the boilers and pumps was completed in September 1902.

The station originally drew water direct from the waterhole on Bundaberg Creek through a suction pipe fitted with a strainer and foot valve submerged about eight feet. By 1907 this had been replaced by a 6 feet by 4 feet by 40 feet deep well adjacent to the pump station. The well encompassed four bores. Water was pumped through a 10 inch cast iron rising main to the water tower.

The water tower comprised a 40,000 gallon mild steel tank on top of a 29 feet diameter, 106 feet high cylindrical brick tower. The tower was constructed by Bundaberg builder N.C. Steffensen and the tank by the Bundaberg Foundry Company. Construction commenced in April 1901 and was completed in September 1902.

From the tower, water was reticulated to the town through a 10 inch cast iron trunk main via Sussex Street to Bourbong Street, the town's 'main street', from whence it was distributed to about 800 premises in Central and South Bundaberg through a network of smaller mains. The reticulation

network was constructed by Council's 'day labour' workforce. Construction commenced in July 1901 and was completed by September 1902.

The location of the pumping station, water tower and trunk main is shown in Figure A1 in Appendix A. Also shown is 1902 Bundaberg Municipal Boundary. At that time the pumping station and water tower were located in the neighbouring Wongarra Division.

The arrangement of the main elements of the scheme is shown in Appendix B. Figure B1 shows a site plan of pumping station and water tower and the connecting pipework.

Bundaberg Waterworks 2010

One major element of the 1902 scheme, the water tower, remains intact and in use as part of Bundaberg water supply network in 2010. The steam pumping plant remained in service for nearly 30 years. In 1930-31 it was replaced by electrically driven pumping plant with automatic control resulting in a big saving in pumping costs. In 2010 there is no visible evidence of the 1902 pumping station remaining on site and there are few documentary or photographic records. There is also no visible evidence of the 1902 reticulation network although much of that network remains in the ground.

The East Water Tower, as it is now known, serves as a fitting reminder of the Bundaberg Waterworks 1902 and as a fine example of late 19th Century water supply technology used in the scheme.

2. BASIC DATA

Item Name:	**East Water Tower, Bundaberg**
Location (Grid Reference):	24º 57' 45" S; 152º 21' 57" E
Address:	17 Sussex Street, Bundaberg Qld 4670
Local Government Area:	Bundaberg Regional Council
Owner:	Bundaberg Regional Council
Current Use:	Water tower (its original use)
Designer:	John Baillie Henderson, Charles Deshon and Frederick Weber of the Queensland Water Supply Department.[1]
Builder:	Brick Tower: Niels Carl Steffensen; Steel tank: Bundaberg Foundry Company (sub-contract)
Year Started/Completed:	1901 (April) -1902 (September)

Physical Description – East Water Tower:

The East Water Tower is a cylindrical brick tower with a 182 kilolitre capacity steel tank on top. The tower and tank have a total height of 35.50 metres.

The tower is constructed of red-brown glazed "Virginia" bricks and set on concrete footings. The tower has an external diameter of 8.76 metres and a height of 32.15 metres. The walls step internally at six points from 915 mm thick at the bottom to 356 mm at the top. The tower has eight (8) levels, marked externally by a band of projecting bricks. Each level has four (4) windows with circular headed arches interspersed with four (4) blind windows of the same form. A sandstone plinth at the top of the tower supports the tank. The interior walls are cement washed/rendered. The load bearing brick walls are thickened at the base to a maximum of 1965 mm where they rest on the footings. There is a concrete base slab across the width of the structure at footing level forming a shallow basement. The interior has timber floors at each level supported by timber framing and linked by timber staircases located on the central north-south axis. There is an entrance doorway at ground level on the south face of the north-south axis and a doorway for tank access in the same location at the eighth level.

The tank is of riveted mild steel construction 8.38 metres in diameter with a total wall height of 3.35 metres. It has an 8.30 metre radius domed bottom. Steel plate thickness varies in three lifts - 7.9 mm at the bottom to 6.3 mm in the middle to 4.9 mm at the top. There is a timber framed and decked access walkway with steel handrails around the base of the tank. Steel ladders provide access from the eighth floor doorway to the access walkway and from the access walkway to the top of the tank. More recent additions to the tank structure are a roof and concrete lining. The roof is sheeted with galvanised steel supported on timber framing. It slopes to a central box gutter which drains into the tank overflow.

Pipe work servicing the tank comprises a 250 mm diameter inlet; a 250 mm outlet to the supply network with an attached scour outlet arrangement; and a 250 mm overflow.

The tower is located on about 830 square metres of land at the corner of Sussex and Princess Streets, East Bundaberg. The tower is surrounded by lawn.

The location of East Water Tower is shown in Appendix A. Original detail drawings of the tower and tank are included in Appendix D.

[1] Whitmore, Raymond L., *Hydraulic Henderson - Water Resources Pioneer,* Engineers Australia, Queensland Division, Brisbane.2009

Physical Condition – East Water Tower:

A condition survey and a structural review of the East Water Tower were included in the *Conservation Study of the East Water Tower, Bundaberg*, undertaken by Archaeo Cultural Services, of Brisbane for the then Bundaberg City Council in 2001. The study's conclusion described the condition as fair to good. A number of threats to the building were identified; including termite infestation although not active, water damage from weather and leakage from the tank, visible cracks in the brickwork, weathering of the sandstone sills, and corrosion of the steel water tank. It was advised that these matters should be monitored, and a program of regular inspection and maintenance should be implemented.

A number of repairs were identified as essential for the long-term wellbeing of the building, including repairs to the external sandstone window sills, repairs to the steel tank and upper walkway, repairs to deteriorated window frames, and repair of damage due to termite infestation. Repairs recommended in the report were approved by the Queensland Heritage Council. (Determination No. 600369.1477) Of this approved work, cleaning and painting of corroded steel to the water tank and repairs to the upper walkway were undertaken, as well as replacement of one heavily deteriorated sandstone sill.

The tower was inspected by Andrew Ladlay Architect in March 2005. Together with the Bundaberg City Council it was agreed that those works requiring external scaffolding access be documented for implementation. The proposed works included repairs and repainting timber windows, replacement of broken glass and discoloured Perspex panes, repairs and repainting of timber sills, repairs to and replacement of sandstone sills and associated works, repairs to the sandstone sill at the top of the tower and the removal of swallows' and other nests from the façade.

This work was completed by the Bundaberg Regional Council in June 2010 at a total cost of $145,000. The project received funding of $45,000 through the "Living Building and Places" Queensland Heritage Conservation Work Grant Program.

Modifications and Dates – East Water Tower:

The timber framed, steel sheeted roof was added to the tank in the 1970s to inhibit algae growth. The roof was constructed within the top of the tank walls and is not visible from the ground. The concrete lining was added to the tank in the 1980s. The external open steel ladders that provide access from the eighth level of the tower to the walkway around the perimeter of the tank and from the walkway to the top of the tank were replaced with caged steel ladders in the 1980s for safety reasons.

Other minor modifications include internal and external wiring, especially the mains connection on the eastern side of the building and galvanised sheeting to the ground floor windows. This sheeting is intrusive but considered a solution to vandalism problems in the short to medium term.

The stairs do not follow the design as originally documented, and on that basis may have been erected at a later date to the rest of the building, perhaps in the period 1910-1920. However there is also no evidence to suggest that the existing stairs were not erected at the time of construction of the rest of the building as a result of a design change at that time.

Historical Notes – Bundaberg Waterworks:

Europeans first settled the site that was to become Bundaberg in 1867-68. The site of Bundaberg was officially surveyed in 1869. The township was surrounded a rich agricultural district and developed as a port and supply centre for the copper mines at Mt Perry. The population grew steadily from 200 in 1871 to 500 in 1876. A decade later the population of the municipality proper was about 2,500.

Prior to 1877, apart from the construction of a small earth dam across a local waterway to form a water hole for cattle, no steps had been taken to supply the town with water. The domestic supply was provided by rainwater tanks and a few private wells. The rest was carted in casks from the nearest or cleanest waterhole. In that year the local Progress Committee approached the Minister for Works George Thorn about an improved supply. It was suggested that a pump be installed at a spring in Tantitha Park just south of the town lifting water into a small reservoir. After some delay only a small amount was provided to clean out the existing earth dam drawing a very angry response from the Progress Committee. An interim scheme was constructed comprising an in-ground circular brick tank of 15,000 gallon capacity built round the spring. No pump or elevated tank was provided; the town having to rely on hand filled water carts for supply. Finally in August 1879 William Highfield the

Government Engineer-in-Charge, Waterworks submitted a plan for a permanent scheme estimated to cost of £1,200. The government declined to fund the scheme and there were no means by which the Progress Committee could raise the funds so the scheme was never implemented.

Local government first came to Bundaberg in 1880 when the Bundaberg Divisional Board was gazetted in March. However after 12 months it was judged that municipal matters could be more conveniently managed under the *Local Government Act.* The town was constituted a Municipality in April 1881. The securing of an ample water supply was seen at an early stage to be indispensable, not only to health and comfort but also the safety of the town. It was believed that swamps and springs from which the town derived its water supply were exposed to sewerage. The supply was considered to be neither adequate nor otherwise satisfactory. Fire also had become a real issue.

Following earlier requests, the Municipal Council in 1884 secured the services of J.B. Henderson, the Government Hydraulic Engineer to report on the source, means and cost of providing a water supply. William Mackinnon of Henderson's department examined five (5) schemes to supply an existing population of 3,000 and an ultimate population of 10,000. Only two (2) schemes – one pumping water from the Elliott River, the other pumping from the Burnett River above the tidal limit, were considered worth of further consideration. The cheaper Burnett River scheme was estimated to cost £57,178. The swamps near town were ruled out as a source as the water "would undoubtedly become unfit for domestic use". Following a visit to Bundaberg by Henderson in January 1886, he prepared his report dated March 1886 which was received by Council in June 1886. The report "lay on the table" for several meetings before being "made a record of the Council". A local commentator reported it as a "highly elaborate scheme…disproportionate alike to local revenues and requirements."

The colonial government recognised the need for a reticulated water supply for the growing town. Loan conditions were gazetted in September 1887 to facilitate the raising of funds for a scheme. Unfortunately, loan approval procedure proved to be cumbersome. Henderson was a stickler for detail and insisted on the submission of professionally prepared plans, drawings and costings.

In March 1889 Alderman W.H. McCann presented a report to council on a water supply scheme for the town. He gave three compelling reasons for having water laid on to the principal and most populated parts of the town:- (1) for domestic purposes; (2) in case of fire; and (3) for sprinkling of the streets (dust suppression). He proposed a 12 inch gravity pipeline to bring water from Baldwin's Swamp at East Bundaberg to a new 500,000 gallon reservoir to be excavated adjacent to the existing reservoir at Tantitha Park. He further proposed the erection of a service water tank with a capacity of 20,000 gallons about 50 feet above the level of the storage reservoirs. The tank was to be supported by a brick building about 27 feet square containing a boiler and pump room, coal store, lumber store and driver's quarters. The pump capacity was to be 13,000 gallons per hour at a head of 90 feet. A 9 inch main was to be laid along Tantitha Street to Woondooma Street to supply the main area of town. The estimated cost was £3,000.

N.C. Clements C.E., Licensed Surveyor and Hydraulic Engineer of Rockhampton, was commissioned by Council to prepare the necessary plan and specifications. His report was received in May. Clements reported that the existing supply at Tantitha Park was sufficient and permanent enough to supply the town for years to come. However should the existing supply be insufficient, Baldwin's Swamp would provide a most valuable auxiliary supply that appeared to be "practicably inexhaustible". He recommended that the proposed gravity system from Baldwin's Swamp be replaced with a pumped system. He determined that the supply should be 100,000 gallons per day based on domestic use of a population of 2,000 plus an allowance for street watering, etc. Clements proposed that the 500,000 gallon reservoir be formed in a natural depression in the north-east corner of the park by placing an embankment on the northern side.

As well as providing reticulation to supply the main town area, Clements recommended that as there were sufficient dwellings in parts of South Bundaberg and the probability of rapid future expansion, that areas of South Bundaberg should also be supplied. The estimated cost of the scheme including South Bundaberg but excluding the auxiliary supply from Baldwin's Swamp was about £7,000.

At the end of May, after consideration by Council, Clements report and plans were forwarded to the Minister for Works for his approval. They were passed on to the Hydraulic Engineer, J.B. Henderson for examination. In August Henderson reported that the drawings and other documents submitted had not been prepared in accordance with loan conditions and contained insufficient detail. He considered the design of the tank and tower to be defective and suggested a round tower with thicker vertical brick

walls supported if necessary by battering pilasters and surmounted by a light wrought iron tank.[2] He returned the documents and asked for amended designs to be provided.

Clements duly provided amended plans and further details as recommended by Henderson which were forwarded in October to Treasury for Henderson's further report. However in January 1890 Treasury advised that the documents were unsatisfactory and that grant of a loan was declined. A copy of Henderson's report was requested and received by Council. The details of that report are not known. Council requested the return of the documents and the matter initially was held in abeyance for six months but the McCann-Clements scheme never proceeded.

The economic depression of the early 1890s was having an impact. Council was still faced with the problem of supplying water for fire fighting and street watering purposes. On two occasions in 1891 and 1892 schemes were proposed. The Town Surveyor, John Falconer, prepared plans for a scheme to pump water from the Burnett River at Barolin Street using a large windmill to elevated 10,000 gallon tanks and standpipes in Quay Street and Woondooma Streets and at the Council Chambers in Bourbong Street. This scheme did not proceed either. By June 1893 Council was in the unenviable position of being without funds to carry out works, except in a case of absolute necessity. John Falconer was given a month's notice of termination of his engagement, an action the Council regretted as Falconer's services had been greatly appreciated.

It was 1896 before the Municipal Council again considered the question of a water supply for the town. At the request of Council, the Hydraulic Engineer J. B. Henderson visited Bundaberg in August and met with council to discuss the question. The source of supply was to be Baldwin's Swamp which Henderson said was palatable and apparently of good quality. The water, on analysis was found to be not absolutely pure but Henderson said that he could not altogether condemn it, particularly as the cost of bringing water from the Burnett and Elliott Rivers appeared to be beyond the present means of Council. Council advised Henderson that the scheme should be designed for a present population of 4,000 and a future population of 8,000. The reticulation network was to service about 800 of 970 residences. After much discussion over the cost of surveys for the scheme and who should pay, Council requested that the Water Supply Department to proceed in December 1897.

The Water Supply Department submitted designs to the Municipal Council in October 1898. The scheme, with an estimated cost of £20,000 was adopted by Council on 2 November. The scheme was to draw water direct from Baldwin's Swamp through a 9 inch rising main and pump into an iron tank placed on a brick tower, some 80 feet high to be built on high ground near the swamp. From the tank the water was to gravitate though 10 inch mains to and through the main streets of town and reticulated through smaller pipes to the secondary streets at a head of 53 feet. In Bourbong Street, in case of fire, it was proposed that the pressure could be increased to 115 feet head by shutting off the tank connection and pumping direct into the mains with both engines. Some felt that there should have been a filter between the swamp and the pump. Henderson advised that could be added afterwards at an additional cost of £2,000.

Council immediately commenced loan raising procedures and advertised its intent. A poll was taken on 14 January 1899 on the question of the Municipal Council borrowing £20,000 to establish a water supply. Polling was heavy and resulted in a three to one majority in favour of the proposed loan. Council resolved on 8 February to make application to borrow £20,000 from consolidated revenue. The loan was secured in the Parliamentary Estimates for 1899-1900.

Detailed planning proceeded. In October 1899 Henderson recommended that the height of the tower be increased by 26 feet. This was adopted by Council. Increasing the height of the tower obviated the need to get up steam to start the pumps in the case of fire (an operation taking about 30 minutes) as originally proposed and was common at that time. The tower was increased to a height of 105¾ feet above natural surface of the ground and was to be surmounted by a wrought iron tank 27½ feet in diameter by 11 feet deep having a capacity of 40,000 gallons.

In September 1899 tenders were invited for the supply of some 850 tons of cast iron pipes, special castings and valves required for the reticulation. In January eight tenders were received but none were accepted as prices had increased greatly and they were considered too high. In December tenders were also invited for the construction of the water tower and tank. Six tenders were received but they too were considered too high and none was accepted. Council was advised to obtain an additional

[2] This appears to be a standard design for water towers at that time. Two water towers built in Victoria circa 1883 that still exist; one at Kerang and one at Swan Hill are cylindrical brick towers 56 feet in height with a 25,000 gallon tank. The walls have battering pilasters.

loan of $2,500. Council agreed and completed the necessary procedures by May. Council called on the local representatives in the Queensland Parliament to push the water supply work with the Hydraulic Engineer.

Fresh tenders were called in June 1900 for the supply of 880 tons of cast iron pipes, special castings and valves. Tenders were to remain open until November to take advantage of an expected fall in metal prices and to allow tenderers to obtain quotes from the United Kingdom and America before tendering. Council urged Henderson to shorten the time for accepting tenders. Henderson instead proposed to commence construction of the water tower and other parts of the scheme ahead of the delivery of pipes. Fresh tenders were called in November for the construction of the water tower and tank; the tank this time to be constructed of mild steel. The tender of N.C. Steffensen of Bundaberg was accepted for the sum of £3,859 0s.10d. Tenders were also accepted in November for the supply of pipes, etc; the successful tenderer being Thomas Brown & Sons Limited of Brisbane for the sum of £10,581 0s. 4p.

Construction of the water tower commenced on 15 April 1901 but work was delayed by difficulties in sourcing suitable bricks. In order to obtain the quality and uniformity required for the project, the bricks were obtained from Virginia Brick Company in Brisbane. It seems that Council was pushing for the use of local bricks. The matter was first raised by Council in October 1900 and was followed by much correspondence with and representations to the Henderson. Henderson advised that the only condition that he insisted upon was that the quality of the bricks should be equal to the best bricks made in and around Brisbane, and must be subject to acceptance or rejection on delivery. The Mayor subsequently advised Council that the best Brisbane bricks were being used until suitable local bricks could be obtained. The concrete foundations and the brick footing courses were completed by June 1901 and by August work on the walls was in progress. Metal work was being constructed at the Bundaberg Foundry.

Delivery and testing of pipes commenced in July and good progress was made. The reticulation work was carried out by day labour. In September tenders were called for the boilers, pumps, pumping station and intake so that all works would be completed at the same time. Tenders were accepted in October as follows: Boiler and pump house, David R. Jones, £1,612. 16s. 3p.; manufacture and supply of Cornish boiler, Bundaberg Foundry Company, £972 119s.; and pumping machinery, Smellie and Company, £503 16s.

Work on the boiler and pump house commenced in December 1901 and finished in June 1902. When Henderson visited in August he found that good progress was being made on the installation of the pumping equipment and expected it to be ready for trial in September. He did not expect all of the £22,500 appropriated for the scheme would be expended. By early September the tower was complete and pipe-laying complete except the main into the pumping station.

Henderson tested the scheme on Friday 19 September 1902 and found it to be very satisfactory. The local press reported that the Snow pumps “running with absolute smoothness and almost noiselessly…accomplished the task of filling the reservoir on the tower within an hour”. The tank had been successfully constructed in place by the Bundaberg Foundry which had been a difficult undertaking. It was further reported “that when the reservoir was tested not a solitary leak or faultily driven rivet was found”. The tower was considered a masterpiece of brickwork.

The Bundaberg Waterworks were handed over by Henderson to the Municipal Council on Saturday 20 September 1902. Mr J.J. Thomas had been appointed engineer-in-charge of the pumping station by Council.

Heritage Listings – East Water Tower:

The East Water Tower is listed in the Queensland Heritage Register and the Register of the National Estate as follows:

	Queensland Heritage Register	**Register of the National Estate**
Place Name:	East Water Tower	Water Tower, 17 Sussex Street, Bundaberg, Qld
Place ID:	600369	8724
Date:		21/03/1978

The tower is also listed by the National Trust.

3. ASSESSMENT OF SIGNIFICANCE

Historical Significance:

The Bundaberg Waterworks, Bundaberg's first reticulated water supply scheme, was constructed in 1901-02. It marks a significant stage in the development of the city's infrastructure and helps to illustrate the development of Bundaberg as a major regional city serving what was one of Queensland's most significant sugar growing regions.

During the 1880s and 1890s the business centre of Bundaberg underwent some significant changes Rebuilding programs necessitated by the fires and the prosperity brought to the community by the sugar industry gradually gave the town a permanent and progressive air with many two-storied brick buildings replacing the more temporary buildings of the 1870s. A major infrastructure issue of this time was the lack of an adequate reticulated water supply. Prior to 1902 the town had to rely on water from an in-ground circular brick tank of 15,000 gallon capacity built round the spring. No pump or elevated tank was provided; the town having to rely on hand filled water carts for supply.

Historical Individuals or Associations:

The Bundaberg Waterworks has a close association with the life and work of John Baillie Henderson, Queensland's first Hydraulic Engineer from 1878 until 1914, a period of significant development and expansion for the Colony and State of Queensland. He was a water resources pioneer and played a major role in water supply schemes for townships throughout Queensland. He also played a major role and in developing tanks and later artesian bores for watering stock routes and inland towns.

Henderson was closely associated with the investigation, design and approval processes and supervision of construction of the Bundaberg Waterworks including the East Water Tower completed in 1902. The Bundaberg Municipal Council first secured the services of Henderson in 1884 to report on the source, means and cost of providing a water supply. The report on the supply was received by Council in 1886 but the proposed supply proved to be too expensive. In 1889 Council commissioned N.C. Clements, C.E. to prepare plan and specifications for a scheme proposed by Alderman W.H. McCann. These were submitted to Henderson for approval but Henderson found that the documents failed to meet loan conditions and the design of the tank and tower to be defective. He suggested an alternative design for the tower. Documents were revised and resubmitted but again failed to gain Henderson's approval and the scheme was abandoned.

At the request of Council, Henderson visited Bundaberg in 1896 to again discuss the provision of a water supply for the town. Following these discussions, Council requested the Water Supply Department to proceed with the design of the scheme. The Department submitted designs to Council in 1898. The design of the East Water Tower 'was most certainly the joint work of Charles Deshon, Frederick Weber (who for many years was Henderson's head draughtsman) and Henderson himself'.[3]

The day to day supervision of construction of the Bundaberg Waterworks, including the tower, was undertaken by assistant engineer Williams under Henderson's direction. Henderson himself visited the site on a number of occasions to check on progress. It was Henderson himself who carried out the final inspection and testing of the scheme, which he found to be very satisfactory.

The East Water Tower, a major element of the Bundaberg Waterworks, is a fine intact example of his work.

Creative or Technical Achievement:

The East Water Tower shows technical excellence and achievement represented by the successful completion of the building's complex masonry and brickwork, and the successful construction methods used onsite for the steel tank. It is considered to be a fine example of the art of the industrial designers Deshon, Weber and Henderson of the Water Supply Department; the skill of the bricklayer N.C. Steffensen; and the skill of the Bundaberg Foundry steelworkers.

Maintaining line and level in the construction of a simple cylindrical brick structure at ground level is difficult enough. When the complexity of arched windows and projecting bands of brickwork is added,

[3] Whitmore, Raymond L., *Hydraulic Henderson - Water Resources Pioneer,* Engineers Australia, Queensland Division, Brisbane.2009

the job becomes even more difficult. However much of the work had to be performed at heights of up to 30 metres above ground level from very basic scaffolding (See Appendix C – Image 1), making the job extremely difficult. Despite these difficulties Steffensen achieved an excellent result which was later regarded by his contemporaries as a "masterpiece of bricklaying"[4].

Construction of a riveted mild steel tank 8.4 metres in diameter and 3.3 metres deep in place at a height in excess of 30 metres above ground level in 1902 would also have been extremely difficult. Heavy steel plates would have had to be hoisted to the top of the tower and held in place and then rivets heated and driven. A contemporary report on completion of construction of the steel tank summarises the achievements of the steelworkers:

> The reservoir had to be built in position, an undertaking that will at once be conceded to be most difficult, and one calling for an abundance of resourcefulness on the part of those engaged in the work, but it was most successfully completed by the Bundaberg Foundry. In this regard it may be mentioned as a most noteworthy feature in view of the difficulty of the work, that when the reservoir was tested not a solitary leak or faultily driven rivet was discovered.[5]

The fact that the East Water Tower remains intact and in use today is further testimony to the technical excellence and achievement of those involved.

The tower is aesthetically distinctive. It is both utilitarian and monumental in form. Its aesthetic qualities include the classical proportions of its eight stories, and the neo-Romanesque qualities of its regular pattern of four semi-circular sprung arched windows and four blank recesses in between at each of the eight floors. Each of the floors is also distinguished externally by a projecting band of brickwork. Window sills and the plinth supporting the steel tank at the top of the brickwork are formed from cut sandstone.

The East Water Tower has landmark qualities. It is a strong contributor to the visual landmarks of Bundaberg. Due to the generally flat surrounding topography, the tower stands as an isolated structure in the eastern part of the city. The nearby low-set residential dwellings make it a dramatic contrast to its neighbours and allow it to dominate the landscape and establish a landmark. The site is clear of other structures, also emphasising its towering form. Its status as an early landmark is shown by the prevalence of graffiti on the inside of the building, some dating back to the 1920s.

Research Potential:

There is perhaps potential to research further the uniqueness or otherwise of the structure in the Australian context.

Social:

The East Water Tower has social significance for the residents of Bundaberg as a distinctive local landmark. Internally, the extensive graffiti dating from over eight decades demonstrates the community's perennial use (except in recent years) of the tower as a local destination, especially for younger couples.

The earliest date noted during fieldwork for the 2001 Conservation Study was 1921 with the graffiti becoming rarer from the 1970s when security at the tower became more firmly established. During earlier decades, it was customary for locals and visitors to climb the tower to enjoy the view, and for children to play racing games, etc. The social value of the inscriptions is their record of local identity.

Today the tower remains a distinctive local landmark being on the list of 'things to see' for visitors to Bundaberg.

Rarity:

The East Water Tower is the only known example in Queensland of a rare building type, namely the cylindrical brick water tower.

Because of its height and design, the East Water Tower may be unique in Australia. While there is a relatively small number of cylindrical brick water towers of various designs still in existence, particularly

[4] *Daily News*, 3 November, 1907
[5] *Bundaberg Mail & Burnett Advertiser*, 19 September 1902.

in Victoria, none identified to date can match the East Water Tower for height. None have a height exceeding about half that of the East Water Tower.

Representativeness:

The East Water Tower is a fine and intact example of late 19th century water supply technology designed to maintain water pressure in the supply network in a very flat terrain. It is a fine example that has been maintained in/restored to a good condition and has retained its visual, structural and functional integrity.

Integrity/Intactness:

Visual Integrity
The East Water Tower has remained aesthetically distinctive and retained its landmark qualities. This is illustrated by comparing Image 2 (1905) in Appendix C with Image 3 (2010). Externally the tower was recently fully refurbished. The only visual changes made to the original structure over the intervening years are to the external ladders and handrails to conform safety standards and the covering of ground floor windows for vandalism reasons. The only intrusive elements are the external and internal wiring, especially the power mains connection on the eastern side of the structure. The nearby buildings remain low-set and the site clear of other structures. The tower still dominates the landscape.

Structural Integrity
The condition survey and structural review of the East Water Tower undertaken as part of the Conservation *Study of the East Water Tower, Bundaberg*, by Archaeo Cultural Services in 2001 concluded that the condition of the tower including the tank was fair to good. The repairs identified at that time as being essential for the long-term wellbeing of the building, have since been attended to. The tower is now in good condition.

Functional Integrity
Except for periods of ordinary and special maintenance, the East Tower has been in continuous service, for 108 years. The tower retains its original function as an elevated storage although it is now part of a much larger network sharing that function with five other larger elevated storages.

Statement of Significance

The Bundaberg Waterworks 1902 and in particular its remaining element the East Water Tower, is significant for its historic, aesthetic, scientific and social values.

The Bundaberg Waterworks, Bundaberg's first reticulated water supply scheme, was constructed in 1901-02. It marks a significant stage in the development of the city's infrastructure and helps to illustrate the development of Bundaberg as a major regional city.

The Bundaberg Waterworks has a close association with the life and work of John Baillie Henderson, Queensland's first Hydraulic Engineer from 1878 until 1914, a period of significant development and expansion for the Colony and State of Queensland. The remaining element of the Waterworks, the East Water Tower, is a fine intact example of his work.

The tower shows technical excellence and achievement represented by the successful completion of the building's complex masonry and brickwork, and the successful construction methods used onsite for the steel tank. The tower is aesthetically distinctive. It is both utilitarian and monumental in form. Its aesthetic qualities include the classical proportions of its eight stories, and the neo-Romanesque qualities of its regular pattern of four semi-circular sprung arched windows and four blank recesses in between at each of the eight floors. The tower has landmark qualities. It is a strong contributor to the visual landmarks of Bundaberg.

The tower has social significance for the residents of Bundaberg as a distinctive local landmark. Internally, the extensive graffiti dating from over eight decades demonstrates the community's perennial use (except in recent years) of the tower as a local destination, especially for younger couples.

The tower is the only known example in Queensland of a rare building type, namely the cylindrical brick water tower. Because of its height and design, the East Water Tower may be unique in Australia.

The tower has retained its visual, structural and functional integrity.

Assessed Significance: Engineering Heritage Marker

Images:

A selection of images (past and present) of the Bundaberg Waterworks including the East Water Tower and the Pumping Station and Intake are shown in Appendix C.

Drawings:

Detail drawings of the East Water Tower are included in Appendix D. They comprise:

- Bundaberg Regional Council Drawing No.11424 – Original Water Supply Department Drawing 73/31 – Plans, Elevations and Sections.
- Bundaberg Regional Council Drawing No.11423 – Original Water Supply Department Drawing 73/31 – Enlarged Plan and Section of Water Tank.
- Bundaberg Regional Council Drawing No.11233 – East Water Tower – General Arrangement (1979)

References:

a. Historical Notes

- *Bundaberg and Mount Perry Mail,* 1877-1884
- *Brisbane Courier,* 1870-1902 at http://newspapers.nla.gov.au.
- *Bundaberg Mail and Burnett Advertiser,* 1895-1902
- Bundaberg Municipal Council, *Minutes – Books 1-8,* 1881-1910. (Bundaberg Regional Council)
- *Bundaberg Star,* 1877
- Clements, W.C., *To His Worship the Mayor and Aldermen of the Municipality of Bundaberg*, Report dated 4 May 1889 re water supply scheme. (Geoff Bullpitt Collection)
- Clements, W.C., *Bundaberg Water Works – Estimates for the Consideration of the Government Hydraulic Engineer,* 9 October 1889. (Geoff Bullpitt Collection)
- Clements, W.C., *Bundaberg Water Works – General Specification for the Consideration of the Government Hydraulic Engineer,* 9 October 1889. (Geoff Bullpitt Collection)
- Clements, W.C., *Bundaberg Water Works – Supplementary Report for the Consideration of the Government Hydraulic Engineer,* Undated. (Geoff Bullpitt Collection)
- *Daily News* (Bundaberg), 1907
- Henderson, J.B., *Proposed Water Supply to Bundaberg,* Queensland Water Supply Department, Brisbane, 19 March 1886. (Geoff Bullpitt Collection)
- Henderson, J.B., Re *Correspondence the Bundaberg Municipal Council respecting a loan for constructing waterworks,* Report dated 1 August 1889 re drawings and other documents submitted. (Geoff Bullpitt Collection)
- McCann, W.H., *Proposed Water Supply Scheme for the Town of Bundaberg,* March 1889. (Geoff Bullpitt Collection)
- Queensland Water Supply Department, *(Annual) Report of Hydraulic Engineer on Water Supply,* (1885-86, 1898-1902), State Library of Queensland.
- Walker, J.Y., *History of Bundaberg – Typical Queensland Agricultural Settlement, W.C. Aiken, Bundaberg, 1890* (Facsimile Edition, Dryden Press, Sydney, 1977)
- Whitmore, Raymond L., *Hydraulic Henderson - Water Resources Pioneer,* Engineers Australia, Queensland Division, Brisbane.2009

b. Other Sections

- Andrew Ladlay Architect, *Specification for Exterior Repairs – East Water Tower, Bundaberg,* May 2005. (Bundaberg Regional Council)
- ARCHAEO Cultural Heritage Services, *Conservation Study of the East Water Tower, Bundaberg*, July 2001 (Bundaberg Regional Council)
- Department of Environment and Resource Management, Queensland Heritage Register, *East Water Tower,* at http://epa.qld.au
- Whitmore, Raymond L., *Hydraulic Henderson - Water Resources Pioneer,* Engineers Australia, Queensland Division, Brisbane.2009

Appendices

Appendix A: Locality Plan

Appendix B: Scheme Arrangement

Appendix C: Images

Appendix D: Drawings – East Water Tower

Appendix E: Nomination Form

Appendix F: Approval of Plaquing by Owner

Appendix A
Locality Plan

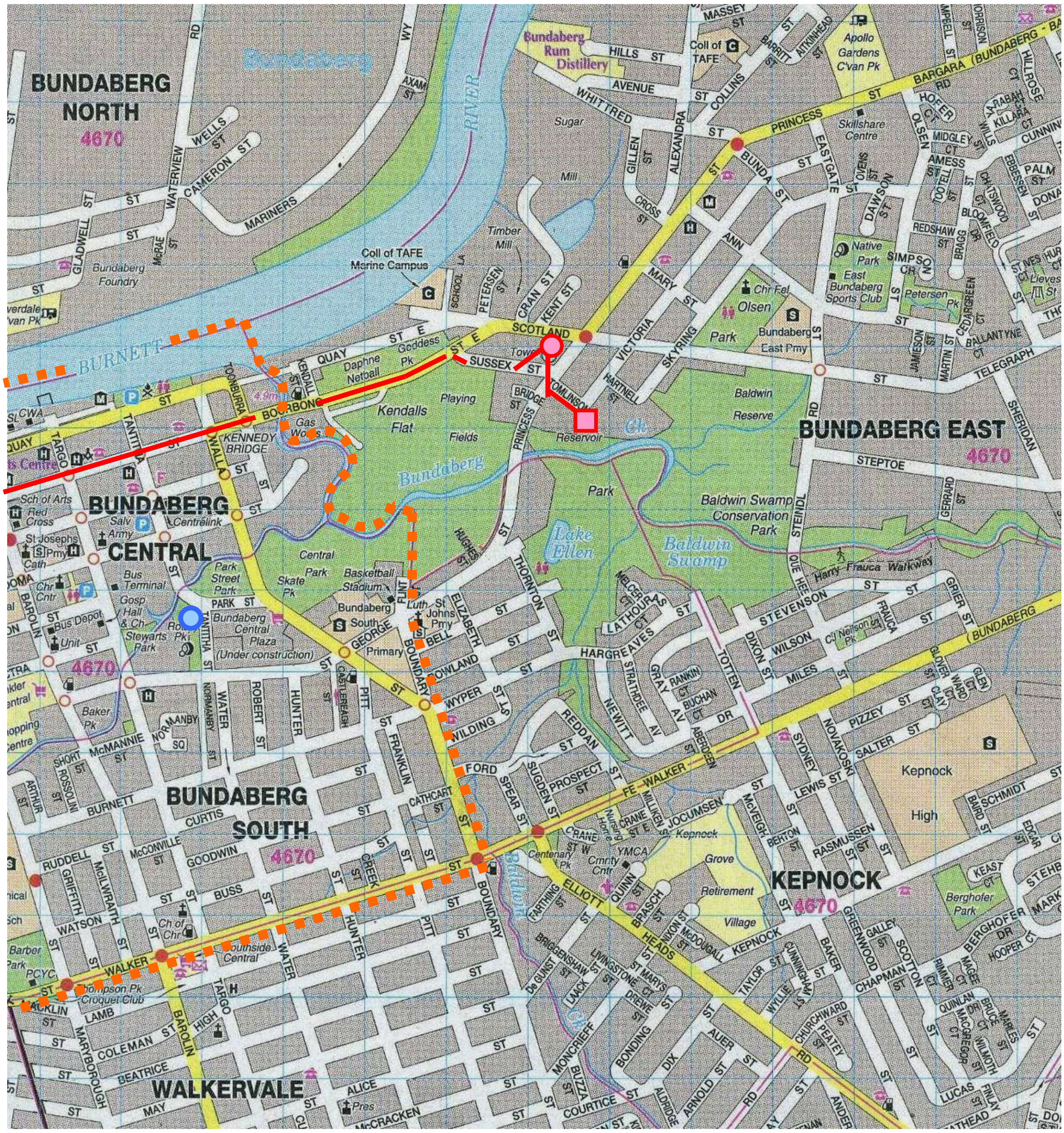


Figure A1 – Bundaberg Waterworks 1902 - Locality Plan

Legend:

Pumping Station

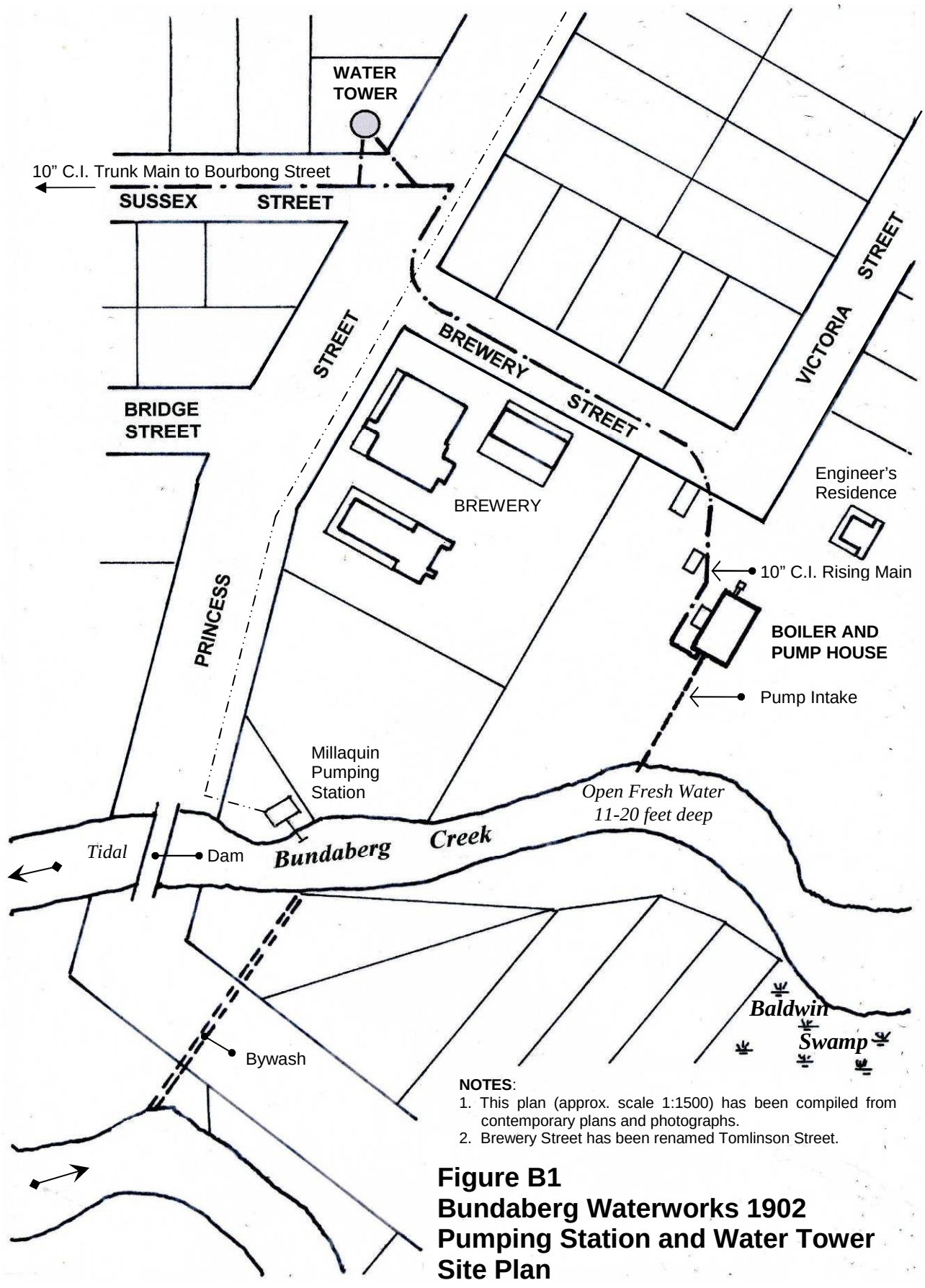
Water Tower

Rising Main / Trunk Main

Municipal Boundary 1902

Original Tantitha Park Supply (1877)

Appendix B
Scheme Arrangement



NOTES:
1. This plan (approx. scale 1:1500) has been compiled from contemporary plans and photographs.
2. Brewery Street has been renamed Tomlinson Street.

Figure B1
Bundaberg Waterworks 1902
Pumping Station and Water Tower
Site Plan

GFB October 2010

14 December 2010

Appendix C
Images

1. EAST WATER TOWER

Image 1 – East Tower under construction 1902. Work was completed in September 1902.

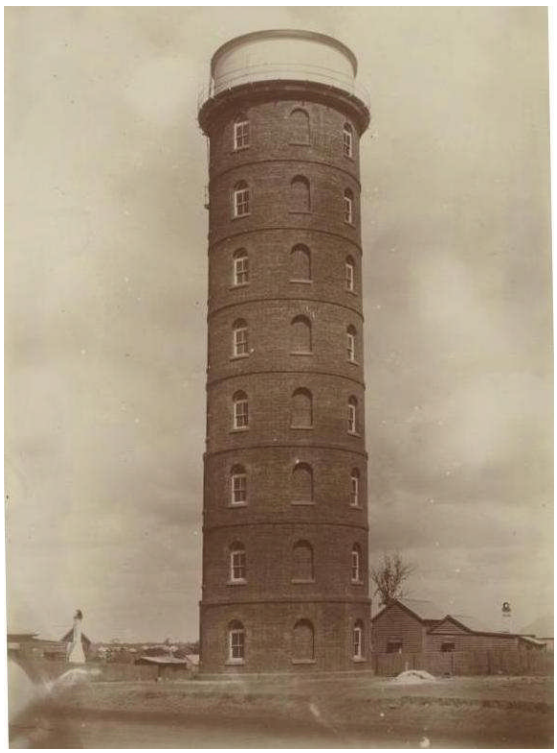


Image 2 – East Tower after completion circa 1905

Image 3 – East Tower in August 2010 following refurbishment.

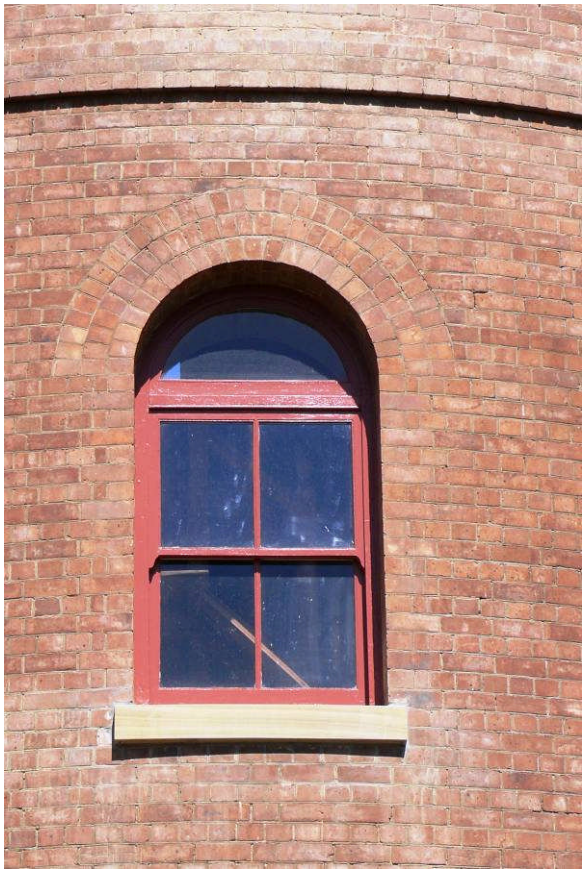


Image 4 – Window detail.

Image 5 – Detail of riveted mild steel tank including the sandstone block and brick corbel support system.

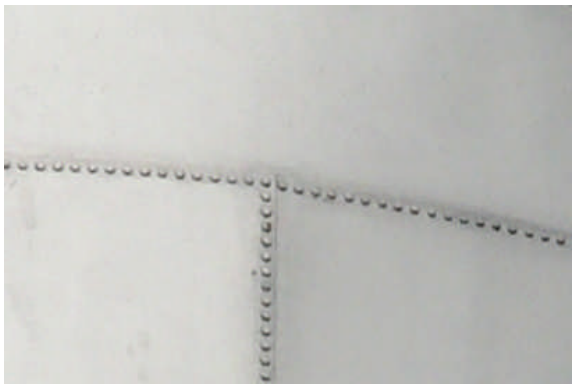


Image 6 – Tank rivet detail

Image 7 – A new sandstone sill fitted in 2010

Image 8 – Bundaberg Regional Council's water spokesman Cr. Alan Bush inspects refurbishment work being carried out on the tower in May 2010.

2. PUMPING STATION & INTAKE

Image 9. – Bundaberg Creek/Baldwin Swamp – the source of Bundaberg's first reticulated water supply, the Bundaberg Waterworks. The town water supply pump intake is in the background (arrowed). The Millaquin intake is in the foreground and the Bundaberg Brewery intake in between.

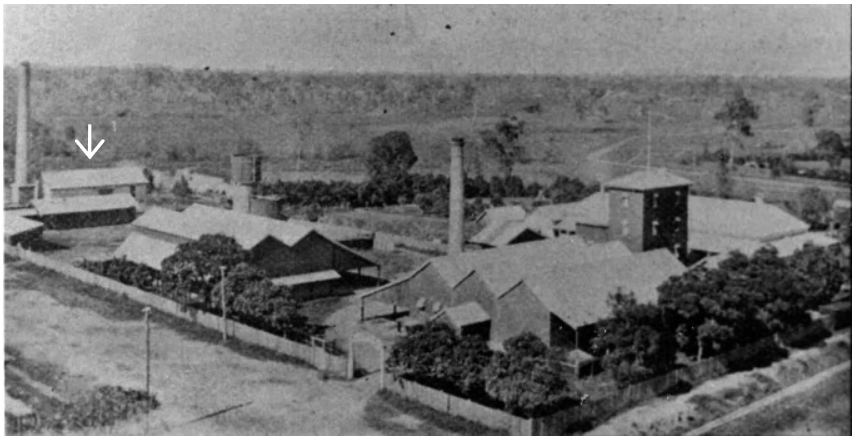


Image 10. – View from East Tower to the south-east in 1907. The Bundaberg Brewery is in the foreground and the Bundaberg Waterworks pumping station (arrowed) in background.

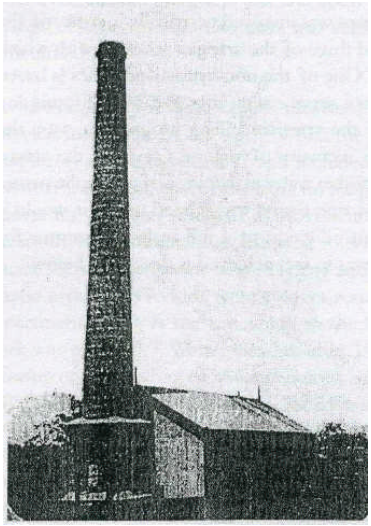


Image 11 – The Bundaberg Waterworks pumping station (boiler and pump house)

3. BUNDABERG ca. 1903

Image 12 – Bundaberg ca.1903 – View from the post office tower looking east along Bourbong Street to the water tower (arrowed). This was the route of the trunk water main.

4. J.B. HENDERSON

Image 13 – John Baillie Henderson (1836-1921)
Queensland Government Hydraulic Engineer
1881 - 1914

References:

Image 1	"Construction of Bundaberg East Water Tower". 1902. Steve Connell Collection, Picture Bundaberg, bun00573.
Image 2	State Library of Queensland, Image Number APO-009-0001-0018
Image 3-7	Geoff Bullpitt collection
Image 8	*Bundaberg News Mail,* 5 June 2010, http:/www.news-mail.com.au/story/2010/06/05/old-water-tower-given-facelift/
Image 9	"Water Supply, Bundaberg". ca. 1900. Dorothy Devantier Collection, Picture Bundaberg, bun00573.
Image 10	Geoff Bullpitt collection
Image 11	Whitmore, Raymond L., *Hydraulic Henderson - Water Resource Pioneer,* Engineers Australia, Queensland Division, Brisbane.2009. p102.
Image 12	State Library of Queensland, Image Number 203168
Image 13	State Library of Queensland, Image Number

Appendix D
Drawings - East Water Tower

1. Bundaberg Regional Council Drawing No.11424 – Original Water Supply Department Drawing 73/31 – Plans, Elevations and Sections.

2. Bundaberg Regional Council Drawing No.11423 – Original Water Supply Department Drawing 73/31 – Enlarged Plan and Section of Water Tank.

3. Bundaberg Regional Council Drawing No.11233 – East Water Tower – General Arrangement (1979)

Appendix E
Nomination Form

The Administrator
Engineering Heritage Australia
Engineers Australia
Engineering House
11 National Circuit
BARTON ACT 2600

Name of Work: **Bundaberg Waterworks 1902**

The above-mentioned work is nominated to be awarded an **Historic Engineering Marker.**

Location, including address and map grid reference if a fixed work:

The remaining works, the East Water Tower, is located at:

Address:	17 Sussex Street, Bundaberg Qld 4670.
Grid Reference:	24º 57' 45" S; 152º 21' 57" E.
Owner:	Bundaberg Regional Council
	PO Box 3130, Bundaberg Qld 4670

The owner has been advised of this nomination and a letter of agreement is attached.

Access:	The site is open to Sussex Street and Princess Street.
Nominating Body:	Engineers Australia – Burnett Local Group

G' Bullpitt

For Chair of Nominating Body

Date: 20 December 2010

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Chair of Division Engineering Heritage Group

Date:

Appendix F
Approval of Plaquing by Owner